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202301UECM2453OE3b

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Started on	Monday, 3 April 2023, 09:41 PM
Completed on	Monday, 3 April 2023, 09:42 PM
Time taken	9 secs
Marks	0/8
Grade	0 out of a maximum of 10 (0%)

1  
Marks: 1

A 1-year European euro-denominated put option for \$100 with strike price of € 0.85/\$1 has a premium of €1.5. You are given:

- The continuously compounded risk-free interest rate for dollars is 0.052.
- The continuously compounded risk-free interest rate for euros is 0.02.
- The current exchange rate € 0.87/\$1.


Calculate the price of a dollar-denominated put option allowing the sale of €100 for \$117.647. \_\_\_\_\_

Answer:

[Make comment or override grade](#)

Incorrect  
Correct answer: 1.019235

Marks for this submission: 0/1.

2  
Marks: 1


Let \$ denote the Australian dollars. Suppose the (spot) exchange rate is £0.42/\$, the pound-denominated continuously compounded interest rate is 0.074,the dollar-denominated continuously compounded interest rate is 0.064, and the price of 1-year £0.4-strike pound-denominated European put on the dollar is £0.0145. What is the price of a dollar-denominated pounds \_\_\_\_\_

Answer:

[Make comment or override grade](#)

Incorrect  
Correct answer: 0.220189

Marks for this submission: 0/1.

3  
Marks: 1

Let  $S(t)$  be the time- $t$  price of stock  $S$  and  $Q(t)$  be the time- $t$  price of stock  $Q$ . These prices satisfy the following stochastic differential equation in the risk-neutral measure:

$$\begin{aligned} dS(t)/S(t) &= 0.04dt + 0.22dZ(t) \\ dQ(t)/Q(t) &= 0.026dt + 0.29dZ'(t) \end{aligned}$$

$Z(t)$  and  $Z'(t)$  are standard Brownian motions in the risk-neutral measure that satisfy:

$$\begin{aligned} Z(t) &= W_1(t) \\ Z'(t) &= 0.74W_1t + 0.54W_2t \end{aligned}$$

where  $W_1(t)$  and  $W_2(t)$  are independent standard Brownian motions. You are given:

- $S(0) = 51$  and  $Q(0) = 204$
- The continuously compounded risk-free interest rate is 0.06.

A European exchange option allows the purchaser to exchange 4 shares of  $S$  for one share of  $Q$  at the end of one year. Calculate the value of this option. \_\_\_\_\_

Answer:

X

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Incorrect  
Correct answer: 14.4736

Marks for this submission: 0/1.

4   
Marks: 1

Consider a model with two stocks. Each stock pays dividends continuously at a rate proportional to its price.  $S_j(t)$  denotes the price of one share of stock  $j$  at time  $t$ . Consider a claim maturing at time 3. The payoff of the claim is  $\max[S_1(3), S_2(3)]$ . You are given:

- $S_1(0) = 151$
- $S_2(0) = 302$
- Stock 1 pays dividends of amount  $0.042S_1(t)dt$  between time  $t$  and time  $t+dt$ .
- Stock 2 pays dividends of amount  $0.084S_2(t)dt$  between time  $t$  and time  $t+dt$ .
- The price of a European option to exchange Stock 2 for Stock 1 at time 3 is 20.

Calculate the price of the claim. \_\_\_\_\_

Answer:

X

[Make comment or override grade](#)

Incorrect  
Correct answer: 254.7279

Marks for this submission: 0/1.

5   
Marks: 1

Assume the Black-Scholes framework for a stock whose time- $t$  price is  $S(t)$ . You are given:

- $S(0) = 90$
- $S$  pays dividends of amount  $0.04S_1(t)dt$  between time- $t$  and time  $t+dt$ .
- $V[\ln S(t)] = 0.116t$
- The continuously compounded risk-free interest rate is 0.09.

Compute the price of  $\min(S(0.1), 96)$  that mature at time 0.1. \_\_\_\_\_

Answer:

X

[Make comment or override grade](#)

Incorrect  
Correct answer: 87.76

Marks for this submission: 0/1.

6   
Marks: 1

For a stock in the Black-Scholes framework, the price at time- $t$  is  $S(t)$ . You are given:

- $S(0) = 56$
- $\sigma = 0.3$
- The stock pays no dividends.
- The continuously compounded risk-free interest rate is 0.037.

A gap call option pays  $c[S(t)]^{0.5} - 56$  if the price of the stock is greater than 67.2 at time 1. Determine the value of  $c$  which makes the price of this option zero. \_\_\_\_\_

Answer:

X

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Incorrect  
Correct answer: 6.2216

Marks for this submission: 0/1.

7   
Marks: 1

Let  $S(t)$  denote the price at time  $t$  of a stock. Consider a 7-month European gap option. If the stock price after 7-month is less than 28, the payoff is  $28.5 - S(7/12)$ ; otherwise, the payoff is zero. You are given:

- $S(0) = 30$ .
- The stock will pay a dividend of amount 3 after 4-months. This is the only dividend that will be paid before the gap option expires.
- The prepaid forward price of the stock follows a geometric Brownian motion with a volatility of 31%.
- The continuously compounded risk-free rate of interest is 10%.

Calculate the price of the gap option. \_\_\_\_\_

Answer:



[Make comment or override grade](#)

Incorrect

Correct answer: 2.4668

Marks for this submission: 0/1.

8

Marks: 1

Assume the Black-Scholes framework. Let  $S(t)$  denote the price at time  $t$  of a nondividend-paying stock. You are given:

- $S(0) = 45$ .
- $\sigma = 0.21$ .
- $r = 0.08$

A market-maker sells a 2-year European gap put option with trigger 40.0 and strike price 50.0. Calculate the number of shares of stock needed to delta-hedge this option. \_\_\_\_\_

Answer:



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Incorrect

Correct answer: 0.04654

Marks for this submission: 0/1.

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